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Where Conservation Begins

The shift from an agricultural to an urban way of life has brought us incomparable material prosperity. But progress exacts its price—for many people the world of field and forest is nearly a closed book.

Nature belongs in our lives, not as an occasional luxury, but as part of our inherent biological need. Over the centuries, for example, poets and mystics have drawn countless metaphors from nature to explain the workings of the human mind and soul. Wise men of many cultures and religions have periodically retreated to the "wilderness" to regain their intellectual and spiritual strength. More recently, biological and social scientists have stressed the importance of direct contact with nature for psychic health.

Despite this vital need, many citizens of city and town dwell in concrete and asphalt canyons, their lives not nourished by a blade of grass, much less a monarch tree. And with each passing year, expanding megalopolis claims ever more open space for homes, factories, airports, and roads.

But we can forge ties with our ancient past. One way is by taking part in National Lawn and Garden Week, sponsored annually by USDA, the horticultural trade, and garden clubs. This year's activities, which open March 20, relate to the theme "Country Green for City Living." Hopefully, the event will be a call for national action that goes far beyond bringing patches of green to crowded city streets. We should plant all available space: in street triangles, in backyards, on window sills, on roof tops, along highways. The more grass, flowers, vegetables, shrubs, and trees we plant, the more we do to arrest the pollution of air, water, and earth.

Perhaps most important of all, we should involve children and thereby sow some seeds for healthier and more humane surroundings tomorrow. Working with children, parents and teachers can instill compassion and concern for growing things. Many children who help tend a garden perceive the unity of life, thus fostering an ecological conscience—a vital trait when their generation assumes its civic role.

Today there is much clamor about repairing the damages wrought against our natural heritage. Too often, however, sincere concern stops at protest or mere rhetoric; people fail to realize that this immense task calls for personal responsibility. Every citizen, whether townsman or countryman, must care and be involved. Let's start in our own backyards.

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COVER: Effluent from the catchment pond at the bottom of a feedlot under study (page 5) can be pumped through pipes for use on neighboring cropland (1170A1077-33).

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Clifford M. Hardin, Secretary
U.S. Department of Agriculture

G. W. Irving, Jr., Administrator
Agricultural Research Service

A FUNGUS and a revolutionary method of applying it are under test against the citrus rust mite, number one pest of Florida citrus groves and a worldwide threat to citrus grown in humid climates.

In Florida alone, growers spend an estimated \$5 million per year for chemical control of citrus rust mites. The mites rupture cells in the rind of the fruit, giving it an unattractive russeted appearance. Fruit thus damaged is unacceptable for the fresh market. Mites also sap the vigor of trees, which results in smaller fruit.

Fungi are among various biological agents under study by ARS as supplements or replacements for conventional insecticides to minimize environmental pollution problems.

In tests exploring the potential biological control of the mites at Orlando, Fla., ARS entomologists Allen G. Selhime, Clayton W. McCoy, technicians Robert F. Kanavel and Alfred J. Hill established what other scientists had suspected for a number of years, that

ARS technician Robert F. Kanavel pours laboratory-grown mycelia into fine mesh cloth sieve. After the liquid is squeezed out, the mycelia are stored at 39° F. until use (0570A322-4).

Fungus tackles a citrus pest





The threadlike fungal mycelia grow throughout the mite's body, killing the pest (PN-1930).

For field application by sprayer, the dry mycelia are taken from storage, measured, and then mixed with water in a blender (570A356-15).



the parasitic fungus, *Hirsutella thompsonii*, destroys citrus rust mites by invading and spreading throughout the bodies of the mites.

A major drawback to practical use of fungal pathogens, however, is that many of the spores die before they can infect the mites when applied in the field as infective spores. To overcome this problem, the Orlando scientists developed a new and unusual approach—spraying the fungal vegetative growth, the mycelia, fragmented in water. The mycelia are thus dispersed in the mite-infested areas to produce fresh spores, grow, spread, and produce more spores. Mites die within 72 hours after infection.

In preliminary field tests, this approach reduced mite populations rapidly and maintained acceptable control for 10 to 12 weeks. In contrast, current pesticides control mites for about 6 weeks.

The new method stems from a 4-year study in which the entomologists discovered a process for rearing the fungus on an artificial medium instead of on mites. This achievement permitted production of the fungus on a large scale for the first time.

To prepare for spraying, the fungus is cultured in 5-gallon containers and harvested after 3 days. The mycelia are then fragmented in a blender and mixed in a water solution. The solution is applied in the field with a high-pressure sprayer.

This method of production is simpler and more economical than spore production. Environmental conditions normally adverse for conventional control measures, such as high humidity, frequent rainfall, and high temperatures, are beneficial to the fungus.

Large-scale tests are needed to evaluate the potential of *H. thompsonii* for controlling the mite. Additional research must be conducted on mass production of the fungus at costs practical for rust mite control. Further tests may also show whether the fungus has potential for controlling other mite species. ■



Braking feedlot runoff

Sampling and recording equipment supply data from the catchment pond (1170A1080-10).

MANAGEMENT SYSTEMS that limit pollution of streams and ground water from beef cattle feedlots are under development in Nebraska.

The Nebraska study is one of many ARS is conducting around the United States to determine the exact threat of pollution from feedlots both to the ground water and to adjacent streams or lakes.

In Nebraska, a new concept of inexpensive runoff control from sloping feedlots—broad-basin terraces—has been installed near Springfield and Omaha by ARS agricultural engineers. Broad-basin terraces, similar to those seen in many fields, are individually designed since no two feedlots—like no two fields—are the same in slope, slope length, annual rainfall, or distance from streams. Data from the two sites may enable ARS to develop general guidelines for minimizing feedlot pollution.

The Omaha feedlot is long and narrow on a steep 15-percent slope with a 350-foot contributing slope length above a lone basin. Because the feedlot is narrow, more than one basin in the lot would hamper feeding operations. The Springfield site is not as long or steep. It has three basins on a 6-

percent slope, with contributing slope lengths of about 120 feet each.

Broad-basin terraces retain runoff on the lots, and the soil and manure materials carried with the runoff are deposited in the basins, which allow suspended solids to settle. After the water has been removed and the basin dried, the solids can be removed as desired.

The Springfield operation is equipped with underground plastic pipe to drain the water to a large detention pond, from which it is later pumped directly to cropland. At Omaha, a pump is used to empty the basin through an irrigation system. Tests are currently underway to determine the maximum amount of liquid the crops can use without damage.

Runoff-recording equipment and ground water sampling wells have been installed on both lots. At Springfield, steel-cased wells—caissons—have also been installed to a depth of 12 feet in the lot and in an adjacent cornfield. These installations will allow study of soil gases and pollutants moving downward under the various conditions in the feedlot and will aid in evaluating management practices. The caisson in the field will be used to compare the

lot with irrigated cropland that has been fertilized.

Wells located immediately below the lot at Springfield have been sampled for 10 months. To date, no samples have exceeded 10 parts per million of nitrate-nitrogen, a figure the U.S. Public Health Service has set as the maximum desirable limit in drinking water.

Soil cores have been taken from all of the lots for analysis, with a comprehensive laboratory program being pursued into the microbiological, chemical, and physical aspects of the various problems encountered. Soil cores will also be drilled into the water table on feedlots with varying soils, slopes, and periods of use as feedlots to determine pollutants in soil and ground water.

Work in Nebraska is a cooperative effort of ARS and the Nebraska Agricultural Experiment Station and is partially financed by Federal Water Quality Administration, U.S. Department of Interior. ARS participants are agricultural engineers Norris P. Swanson and Jeffery C. Lorimor; microbiologists Thomas M. McCalla, Lloyd F. Elliott, and James R. Ellis; and soil scientists Lloyd N. Mielke and Gerald E. Schumann. ■

As he handweeds a paddy, a Korean farmer in the study wears a breathing device that measures oxygen consumption. Measurement is used in calculating energy expenditures (PN-1931).



Gauging human food needs

— New tool for planning exports and food aid to the Far East

A sample energy-use table (24-hour period) for a farmer in the 21- to 49-year age group on a typical day for transplanting rice. Weight range was 120 to 138 pounds (PN-1932).

Activity	Time (minutes)	Energy (calories)
In bed.....	362	361
Recreation and off work:		
Dressing and washing.....	12	18
Light Domestic.....	43	60
Light Sedentary.....	235	304
Working:		
Standing.....	69	328
Removing seedlings from nursery..	117	494
Planting seedlings.....	532	2,054
Walking.....	70	288
TOTAL.....	1,440	3,907

BASAL METABOLISM, energy expenditures, and the daily life and work of over 2,000 Koreans. ARS-sponsored research at Seoul has taken these elements, measured them, and produced a statistical gauge for computing the energy needs of any population group of known composition and activities.

Basic data from this Public Law 480 project can be valuable to the United States in estimating food needs of developing countries in the Far East. Heretofore, figures used to plan exports and food aid have been primarily adapted from those obtained in studies of U.S. occupations and populations. There had not been a substantial amount of figures from actual determinations that could be used with confidence in calculating the needs of another population group.

This project was conducted at the College of Medicine, Ewha Woman's University, under the direction of principal investigator, Dong Jun Kim, M.D. ARS nutritionist Ruth M. Leverton, Washington, D.C., was sponsoring scientist.

To get accurate calculations of total energy expenditures, Dr. Kim and his associates first laid a statistical groundwork for basal metabolic rate (BMR), or the energy needed to maintain vital

processes in the body at rest. To do this, they conducted BMR tests on 2,044 Koreans from 4 to 92 years of age, male and female, engaged in a variety of activities and occupations.

The scientists then measured energy requirements of Koreans by age, weight, and sex for 230 different activities and clinically determined the energy expenditure needed for both basal metabolism and activity.

The activities included:

- ordinary living procedures, such as sitting, dressing, eating, and domestic tasks;
- sedentary and professional school attendance tasks;
- agricultural tasks;
- construction tasks, such as shoveling, carrying stones, cementing, and carpentering;
- military tasks, including drilling, cleaning equipment, and practicing combat.

Figures thus obtained for basal metabolism and for activity were used to calculate the total 24-hour energy requirements of 1,008 persons in different occupations. Detailed time-activity records for periods of from 3 to 7 days were kept.

The total energy expenditure was then computed by multiplying the caloric value of BMR and of each activity by the length of time spent in it and totaling the separate products. The caloric value of sleeping was arbitrarily assigned the individual BMR in each case.

The Korean findings can be summarized into figures for the total energy needs, including BMR, at different activity levels for both sexes.

Calories per 24-hour day

Men:	2,700—sedentary, light work
	3,000—moderate work
	3,600—heavy work
	3,250—for an army cadet
Women:	2,200—sedentary, light work
	2,800—heavy work

By comparison, the recommended daily caloric intake for the average American male engaged in moderate activity is 2,600. ■

For crisper french fries

ONLY ONE STEP in an experimental ARS process for making frozen french fries differs from current processes—but it could make a big difference in the food that reaches the plate.

In the experimental process, raw potato strips are exposed to irradiation from infrared burners that generate temperatures of 1,650° to 1,700° F. at their surfaces. The other processing steps are unchanged.

When raw strips are heated under the infrared lamps, a gelatinized layer of starch forms a shell on the surface. This shell is mainly responsible for the improved quality. It reduces the amount of oil absorbed during cooking and, by providing rigidity after cooking, helps maintain crispness and shape of the finished french fries.

The infrared pretreatment was developed at the Western marketing laboratory, Albany, Calif., by plant physiologist Merle L. Weaver and engineer Charles C. Huxsoll.

The researchers found that with the pretreatment they can consistently produce frozen french fries that:

- Can be finished in the oven while still maintaining the same flavor, appearance, crisp outer surface texture, and mealy baked-potato internal texture as those that were finished in oil.

- Keep their shape, appearance, and crispness for a longer time after preparation than frozen french fries prepared by the normal process.

- Have a lower oil content than conventional french fries. A certain amount of oil is needed for french-fry flavor, but Dr. Weaver says oil content of strips can be reduced probably more than 25 percent without appreciable loss of flavor. This would appeal to calorie-conscious consumers.

The ARS scientists know the infrared pretreatment makes a better quality french fry. Before the method can be used commercially, however, equipment must be designed to turn potato strips, while they are being irradiated, in such a way that the entire surface of each side will receive equal exposure to the irradiation. In the laboratory trials up to now, this has been done by heating only a few strips at a time and turning them by hand.

Continuous infrared processing equipment is being developed in current research. Some commercial food processors and equipment manufacturers, impressed with the potential of the product, also are known to be working on the design of infrared equipment. Conventional equipment can be used for the rest of the process. ■



Left: Plant employee looks through loading hatch on top of car to be sure compartment is empty (1170C1120-11).



Bulk hoppers for POTATOES

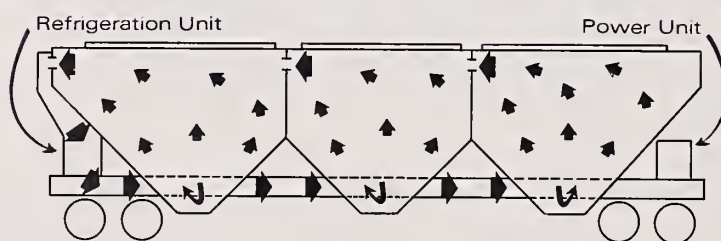
SPECIALLY DESIGNED rail cars for hauling fresh food products in bulk promise to save industry millions of dollars annually and could become a major link in the chain of mechanized systems for moving many commodities from farm to market.

The economic potential of the new bulk hopper jumbo cars for transporting one product, California Long White table potatoes, is under study by ARS marketing specialist William B. Black, in cooperation with the Potato Growers Association of California. The mechanically refrigerated cars are commercially manufactured.

Studies so far show that bulk hopper cars can haul over 180,000 pounds of potatoes per load—about three times as much as conventional cars—at savings of over \$1,000 per load compared with costs to move an equivalent load in three conventional jumbo cars.

Each year, more than 9 billion

Right: Arrows indicate movement of refrigerated air in the three bulk hoppers of each car (PN-1941).





Center: Hoppers are loaded through the top and unloaded from the bottom by conveyor (1170C-1123-8). Right: Unloaded potatoes move on conveyor into plant for grading (1170C1121-17).

N THE MOVE

pounds of potatoes are shipped throughout the United States. Most potatoes are shipped after grading to terminal market repackers in 50- and 100-pound burlap sacks. The potatoes are sacked and the sacks are tied, trucked into the cars, and stacked by manual labor. At the terminal the procedure is repeated in reverse. Sacks are costly, labor is expensive, and the excessive handling accounts for considerable damage to the product.

Bulk shipping in the hopper cars eliminates most of this. The potatoes are moved out of the grading plants on conveyors directly into the hoppers, transported to their destination and unloaded—again by conveyor. After unloading at the terminals, the procedures for packing into consumer-size units—usually 5-, 8-, and 10-pound bags—are the same for both systems.

In the tests, the amount of salable bulk-shipped potatoes averaged about

2 percent higher than the amount of those shipped conventionally.

Another saving is gained in reduced refrigeration costs per product pound delivered. The refrigeration charge is the same for a 180,000-pound load as for a 50,000- or 60,000-pound conventional carload. Also, the single piece of refrigeration equipment and the one power unit used on the new hopper cars require less total maintenance and servicing than the total number of units on the conventional cars needed for a similar load.

Mr. Black suggests that additional savings likely will come from reduced freight charges, since one of the hopper cars can be handled more easily than three of the conventional cars.

The new cars have three hoppers that readily accommodate several standard mechanized loading and unloading systems. The hopper's interiors are slick-sided to prevent product abrasion and

dirt buildup, and they are easily cleaned. The exteriors have a 2-inch thick, sprayed-on coating of polyurethane foam along the sides and 3 inches on the top for insulation. The refrigeration and power units are mounted on opposite ends of the cars for convenient servicing and maintenance.

The potatoes are cooled or warmed as necessary by a current of air that is forced upward evenly through the load. This constantly circulating air stream not only conditions the potatoes but also carries off harmful respiration byproducts.

"While our current research is concerned with the bulk movement of vegetables and citrus," says Mr. Black, "I'm confident that this method of transport eventually will be extended to other agricultural products, and that it will provide greater efficiency and economy than ever before." ■

A brand under the proposed system. It reads 4B47131A2. The initial 4 represents the number 4 position of the arrow; B4, position 4 for letter B; 71, position 1 for numeral 7, etc. (PN-1934).

Worldwide tamperproof brands



INTERNATIONAL IDENTIFICATION of cattle could be a real boon to the cattle industry—and may not be far away.

With the help of the freeze brand, ARS veterinarian R. Keith Farrell, Pullman, Wash., has devised a system that provides over 27½ billion unique marks—enough variation to assign a different brand to any rancher in any country of the world.

This is important because present fire brands, while useful for local and State identification of animals, lose their usefulness on cattle shipped across State and national lines. Large numbers of brands employ the same or similar letters, limiting thereby the number of unique brands. Also, these fire brands can easily be altered illegally.

Dr. Farrell's method, called the "International Freeze-Mark Animal Identi-

fication System," employs the freeze brand, which permanently marks cattle with a super-chilled iron (AGR. RES., June 1966, p. 8). Where the iron has been applied, the hair grows out white, leaving a brand that is visible at great distances. On light-colored animals, applying the freeze brand for a few extra seconds leaves a bald mark but causes much less damage to the surrounding hide than a bald mark by the fire brand.

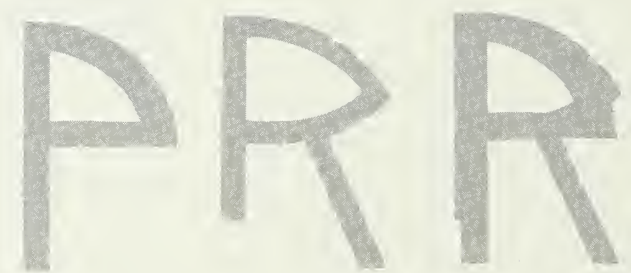
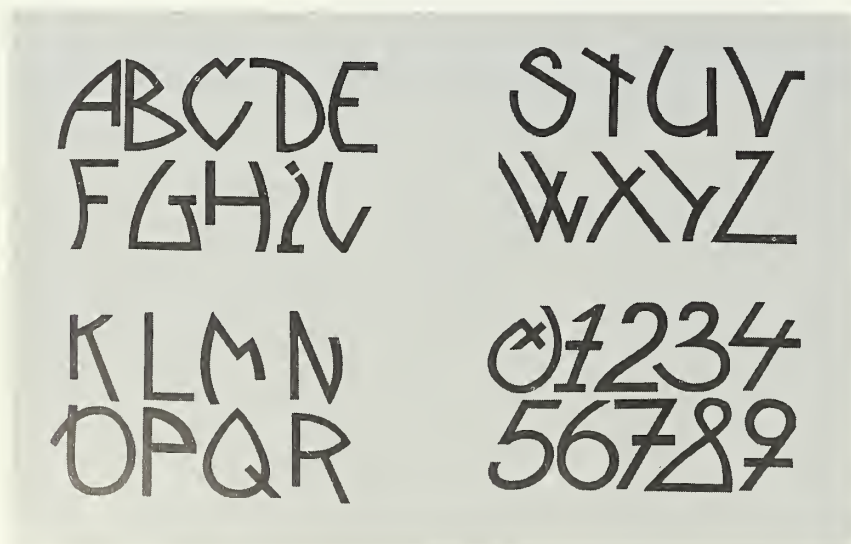
The new identification system employs stylized letters and numerals that cannot be altered to look like similar letters and numerals. For example, a P cannot be made to look like an R by adding a "foot." If such an alteration were attempted, the change would be immediately obvious because the two letters have a different foot length and "belly" style.

Each of the letters or numerals is

placed in a quadrant formed by two perpendicular lines intersecting at the midpoint with an arrow at the end of one of the lines. The quadrants may be turned in four directions, each identifiable by the direction of the arrow.

One character from each of the digits 0 through 9 or the letters A through Z is placed in each quadrant. Digits and letters can be turned in eight different directions. Thus there are 36 characters, each with eight possible positions. Also, each quadrant has four different directions as indicated by the arrow.

This system effectively prevents brand repetition or altering, making it easy for ranchers to identify animals for legal reasons or to trace the breeding or background of a specific animal. And in disease-control programs, an animal could be traced to its home range anywhere in the world. ■



Left: Letters and numbers are identifiable with our alphabet but individual enough so no symbol can be altered to become any other symbol (PN-1935). Above: An attempted alteration of the letter P to R (PN-1936).

... News that's fit to eat

FEEDING OLD NEWSPAPERS to farm animals may be one way to reduce their competition with man for cropland that supplies direct human needs.

ARS animal scientist David A. Dinius at Beltsville, Md., found that newsprint could replace some forage in the ration. His studies are part of a general effort to make ruminant animals, e.g. sheep, beef cattle, and dairy cows, more efficient users of materials that man can't eat and which may pose potential pollution problems.

In one experiment, Dr. Dinius simulated a winter feeding situation to find out if newsprint and molasses could partially replace hay. Newsprint was used because it was readily available, but any wood byproduct would have served.

Newsprint was ground in a hammer-mill and blended into a ration at 0, 8, 16, or 24 percent. Molasses content was increased with addition of more newsprint because, according to preliminary trials, steers don't like the taste and eat less of the high-newsprint ration without molasses.

The ration also contained ground timothy hay, soybean meal, cracked corn, trace mineral salt, and dicalcium phosphate.

Average daily gains were the same for steers fed the 0 and 8 percent newsprint mixture, about 1.9 pounds, but dropped to 1.2 pounds with 16 percent paper and a half-pound with 24 percent. Average daily feed intake also declined with increasing newsprint.

A preference trial indicated that steers did not reject the high newsprint rations because of the ink. Two identical rations were fed, each with 24 percent newsprint, but the paper in one was printed while the other was clean. There was no difference in intake.

A finishing trial was then run to see if low levels of newsprint could replace



Steer feeds on mixture of 1 part newspaper to 9 parts concentrates (1070A980-4).

roughage. Among the four rations tested, one had no roughage, one contained ground timothy hay as the roughage, and two had newsprint as the only roughage source at 5 and 10 percent. Remaining ingredients were similar to the rations used in the wintering study.

Average daily gain was greatest for the steers fed the hay ration, 2.8 lbs., followed by the 5-percent paper group, 2.7 lbs. Daily gains for steers fed 10-

percent paper were the same as for those on no-roughage rations—about 2.4 pounds.

All steers in the finishing study were slaughtered at around 950 pounds. There were no differences in any carcass evaluation measures among steers on any ration.

Overall, newsprint did not appear to have any adverse effects on the animals studied, and up to at least 8 percent can serve as a roughage substitute. ■

Experimental unit applies charcoal bands before planting. Most conventional planters, including grain drills, can be easily fitted with drop nozzles and used for applying charcoal bands (PN-1937).



This charcoal filter stops herbicides

ACTIVATED CHARCOAL applied at planting time promises grass seed growers an extra safety margin in establishing stands and in getting weed-free crops year after year.

The charcoal technique, developed by ARS agronomist W. Orvid Lee in cooperation with the Oregon Agricultural Experiment Station, Corvallis, involves 1-inch-wide bands of charcoal laid directly over seed rows at planting. The charcoal intercepts and absorbs herbicides and prevents them from moving downward. This action provides a "safety zone" where seed can germinate and seedlings can develop virtually unaffected by the chemicals.

Several herbicides offer good weed control, and grass seedlings have some tolerance to them. But certain weather and soil conditions may reduce this tolerance, with damage to the crop. The charcoal overcomes this drawback.

In his experiments, Dr. Lee mixed activated charcoal at a ratio of one-half pound per gallon of water with char-

coal rates ranging from 75 to 300 pounds per acre. The charcoal was applied as a slurry with a special applicator designed by Dr. Lee.

The charcoal was then evaluated for effectiveness against diuron, atrazine, simazine, terbacil, bromacil, protham, and chlorprotham at rates commonly used for preemergence weed control. The herbicides varied in their responses, with diuron being the herbicide most readily inactivated by the charcoal.

A good stand of grass developed on diuron-treated plots where charcoal was applied at 150 lbs/a, but few grass seedlings survived on plots treated with the other herbicides at this rate. On plots treated with 300 lbs/a of charcoal the grass survival rate was satisfactory.

Some weeds occurring in seed rows also were protected, but they could be easily hand-weeded or controlled by herbicides when the grass seedlings were beyond the critical growing stage.

Dr. Lee says the cost of the charcoal would be justified, especially in produc-

ing high-value crops. For example, material would cost only about \$6.50 an acre where grass is planted in rows 12-inches apart and charcoal is applied at 300 lb/a.

Once established by this technique, grass stands have remained almost weed-free, and a high level of control has been maintained with presently recommended methods. Also, when irrigation is available so crops can be started in early fall, growers can get a weed-free crop the first year instead of planting in the spring and waiting a full year for the first harvest.

Dr. Lee says that additional research may help adapt the technique to other crops. Although the technique won't replace good management and good farming practices, it can be an effective tool in helping growers get needed quality and improved yields.

None of the herbicides are registered for use with grass seed. Additional studies are needed to determine and evaluate any possibly adverse effects on the environment. ■

A NEW SIPHON TUBE that automatically resumes operation after interruptions in the water supply is another promising step toward automated irrigation.

The standard siphon tube is a well-accepted device for transferring water from a ditch or basin to the field with economy, speed, and uniformity. But some built-in problems are overcome by the experimental siphon tube. It was developed by ARS agricultural engineer Robert V. Worstell at the Snake River Conservation Research Center, Kimberly. The Idaho Agricultural Experiment Station cooperated.

When the water supply decreases or is interrupted, standard siphon tubes lose their suction or "prime." They empty, and flow ceases until they are reprimed. When water is pumped electrically, for example, a brief drop in the voltage often stops the pump because of low-voltage safety controls. When the pump is restarted, the siphon tubes must also be restarted. Sometimes pumps are rigged to start automatically after such an outage; if an irrigator is not present to reprime the siphons, water may fill the ditch, overtop the bank, and possibly wash out a portion of the ditch and part of the crop.

Problems are also created by moss and trash clogging regular siphon tubes, cutting down the flow until air enters the outlet. The prime is then lost, and the irrigator must clean and reprime the tube. Upstream strainers and grates are only partially effective.

The auto-start tube holds its prime for 10 to 14 days. It is equipped with a "cup" at each end that traps the water in the tube so air cannot enter to break the siphoning action. The inlet cup is screened to catch any debris.

Cups are designed to hold a 3-inch depth of water above each end of the tube if the ends are at the same elevation—a critical must. The 3-inch depth is enough to take care of evaporation for the 10- to 14-day period between irrigation.

Pilot models of the tube were formed from 1-inch and 3/4-inch diameter elec-

trical conduit tubing with each end section bent to a 45-degree angle from the center section. The inlet leg thus conforms to the side of a concrete-lined ditch when the center section is level. The tube has also operated satisfactorily in earthen ditches, provided the center section is leveled. Outlet cups are adjustable to reduce or increase the flow from the siphon.

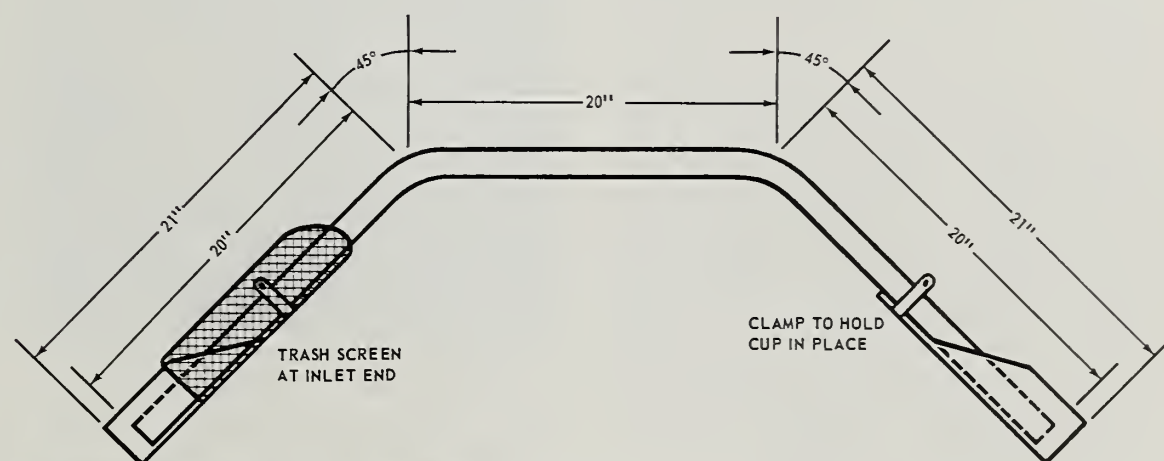
A side benefit of the auto-start tube

is that the cup at the outlet reduces erosion of furrows in sandy soils. The water does not exit as a jet but bubbles upward and flows gently from the cup to the furrow.

Cost of the self-starting tube may run about double that of a conventional siphon when a production model is available, but the convenience and advantages to many irrigators may justify the added expense. ■

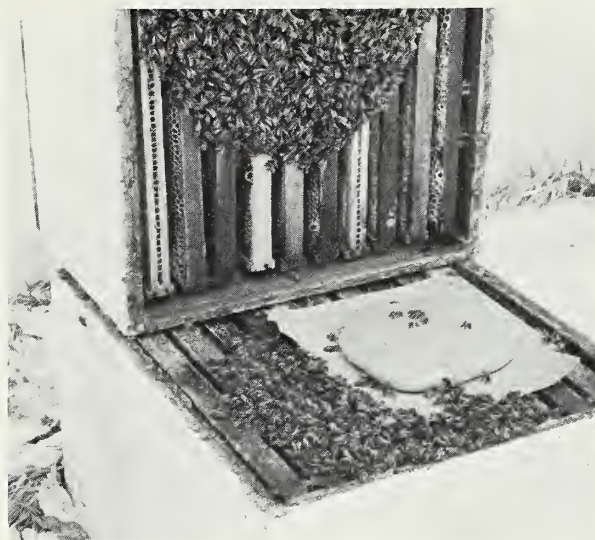
for irrigation ...

The Fail-Safe Siphon



Above: Measurements and design of the experimental tube. Top length must be level so cups are at the same elevation (PN-1938). Left: Mr. Worstell primes the experimental tubes for field tests (PN-1939).

Antibiotic patties for bees



The patty in action (PN-1940).

LABOR AND TRANSPORTATION costs involved in administering antibiotics to bee colonies can be greatly reduced by using antibiotic extender patties.

In tests run on 54 colonies deliberately infected with American foulbrood disease, a single antibiotic extender patty placed in the hive was more effective than seven dust applications of the antibiotic. Moreover, the patty required only one-seventh as much labor. All colonies treated with these patties completely recovered from the disease in less than 2 months.

Antibiotic extender patties were developed by ARS pathologist William T. Wilson, entomologist James J. Lackett, and technician James R. Elliott at the ARS Bee Laboratory in Laramie, Wyo.

The patties were made in four formulations of 2 level teaspoons of Terramycin (soluble TM-25 powder) stirred into sugar (powdered or granulated), then combined with either non-medicated petroleum jelly or vegetable fat. The mixture was then molded into large patties and wrapped in heavy brown wrapping paper for easier

handling and storage. All formulations proved effective.

Researchers treated a colony by placing a patty on the top bars above the brood nest. If the brood nest was in two hive bodies, the patty was placed on the top bars of the lower hive body. So placed, the patty could not be ignored by the nurse bees caring for the brood.

There was no evidence that the ingredients of the patties were stored in the combs, even though the patties were in the colonies for more than 2 months.

Although too much Terramycin can kill honeybee brood, and the extender patties contained large amounts of Terramycin, the slow rate of consumption prevented any appreciable number of deaths.

Further testing will be necessary to determine the best patty size and to understand how the antibiotic extender performs when applied under the varied environmental and managerial conditions common to the beekeeping industry.

Terramycin is not registered for use in extender patties although it is approved when administered in sugar or honey solutions or dusts. ■

Which temperatures kill wax moths ?

EXPOSURE to selected temperatures will efficiently and economically eliminate all stages of the greater wax moth from bee equipment.

Because the greater wax moth (*Galleria mellonella*) destroys dry combs and causes unsightly damage to comb honey, commercial beekeepers need a low-cost method of eradicating this pest.

In ARS tests by entomologist George E. Cantwell and technician Leonard J. Smith at Beltsville, Md., the best treatments for 100-percent kill of the wax moth in all stages of the life cycle were:

- In dry comb, 115° to 120° F. heat for 80 and 40 minutes respectively.

- In comb honey, temperatures of 0° to 5° F. for at least 2 hours.

The choice of high or low temperature depends on the reason for treatment and availability of equipment. High temperatures can eliminate both the wax moth and nosema disease from dry combs but may ruin comb honey (AGR. RES., May 1968, p. 3). Cold treatments affect only the wax moth but are safe with comb honey.

In the tests, the heat treatments were administered in a chamber that kept the temperature constant and uniform and the relative humidity at 50 percent. Wax moths were exposed to 110°, 115°, and 120° F., for the period of time necessary to obtain 100 percent kill in all

stages. Prolonged exposure at 110° did not adversely affect the wax moths.

A household freezer was used to expose all stages of the wax moth to temperatures of 0°, 5°, 10°, 20°, and 30° F. The shortest time required for 100-percent kill was 2 hours at both 0° and 5° F. temperatures.

Although the 120° heat treatment is quicker than the cold, it requires certain precautions: (1) comb should contain little or no pollen or honey, (2) comb should be exposed in an upright position (not on its side), (3) air circulation must insure even heating, and (4) the chamber temperature must be uniform, as excessive heat causes comb to soften and sag, thereby ruining it. ■

Ian McHarg named Morrison lecturer

Ian L. McHarg, a landscape architect known for his pioneering and dynamic designs to correct environmental mismanagement, will give the fourth annual B. Y. Morrison Memorial Lecture, March 10, in Portland, Oreg.

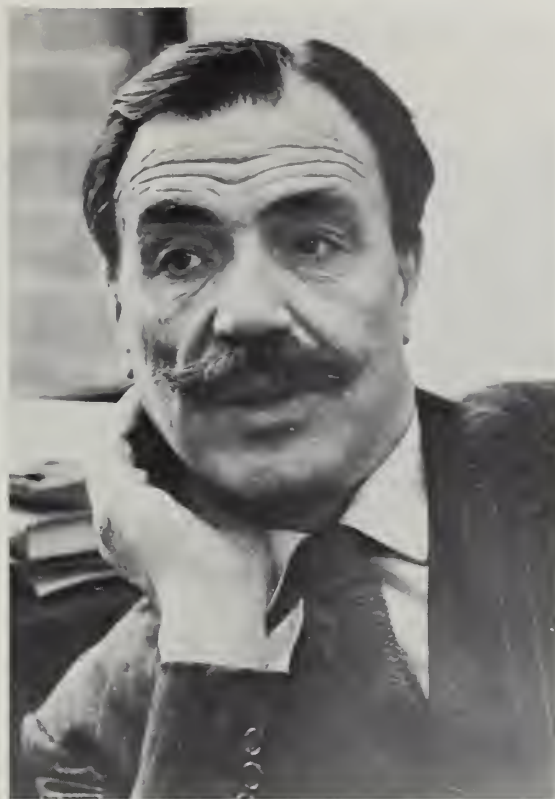
The lecture will be delivered at the 36th annual North American Wildlife and Natural Resources Conference under the auspices of the Wildlife Management Institute. The lecture is sponsored by ARS in honor of Benjamin Y. Morrison, the first director of USDA's National Arboretum. Theme of the 1971 Conference will be "Resource Use and Quality of Living."

Professor McHarg is a practicing landscape architect as well as regional planner, writer, and lecturer. He holds the Chair of Landscape Architecture and Regional Planning at the University of Pennsylvania, Philadelphia.

In a review of Professor McHarg's recent book, *Design with Nature*, Time magazine said: "He is not only a symbol of rising anger at environmental abuses, but a successful practitioner of the hard art of stopping those abuses."

Even the television medium has felt the impact of his concern for ecological problems. During 1961 he was host for *The House We Live In*, CBS-TV series on man and environment, and in 1969 he appeared in *Three Young Americans in Search of Survival* (ABC-TV) and the NET-TV production, *Multiply and Subdue the Earth*.

Morrison Memorial lecturers are chosen for their outstanding contributions to the practice of ornamental horticulture and to the enhancement of man's environment.



Professor McHarg (BN-37320).

Clover in grass yields more forage

Annual clover seeded into Coastal bermudagrass in the lower Southeastern grazing areas benefits beef cattle producers and helps reduce the need for nitrogen fertilizers.

In field plot experiments spanning 4 years, grass following clover produced an average of 18 percent more forage than grass without clover receiving 200 lbs/a nitrogen. Total forage production was 47 percent higher from a sequence of crimson clover-Coastal bermudagrass than from grass with no clover that received 200 lbs/a nitrogen. Seeding sod with crimson clover resulted in 33 percent more forage than with arrowleaf clover.

ARS agronomist William E. Knight conducted the research in cooperation with the Mississippi Agricultural Experiment Station, State College. "The studies," he says, "suggest the utiliza-

tion of winter-annual clovers to supply part of the nitrogen requirement of summer-growing grasses. Additional benefits would be derived from an extended grazing season, increased total production, increased forage quality, and better utilization of land resources."

Rapid test for weevil resistance

Now there's a new, rapid technique for screening cotton seedlings for resistance to boll weevil feeding.

Screening ordinarily doesn't begin until cotton plants reach the flowering and fruiting stage, 2 months or more after planting. But in ARS research at State College, Miss., geneticist Johnie N. Jenkins and entomologist William L. Parrott used 1-week-old seedlings.

They covered the seedlings growing in sand-filled flats with a Plexiglas cage fitted with a screen wire top. Three 6-day-old weevils per seedling were put on the plants, which were placed in the dark at 90° F. and 45- to 55-percent relative humidity.

At the end of 24 hours (cycle 1), the surviving seedlings were transplanted into a new flat and two weevils per seedling placed on them for another 24 hours (cycle 2).

In cycle 3 the plants which survived cycle 2 were placed in a flat with twice as many randomly selected seedlings of the same age and strain. Two weevils per seedling were added and allowed to feed until all randomly selected plants were killed. Then those seedlings surviving all three cycles were transplanted into peat pots and grown to maturity and tested for resistance.

"Not only is this a rapid method," says Dr. Jenkins, "but accuracy com-



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pares favorably with other methods that take much longer. In our experiments we have screened 286,424 seedlings representing seven cotton biotypes, and we've selected 47 that survived the three cycles."

Dogs provide clues to skin strength

A colony of dogs affected with a rare skin condition that resembles a human disease has been established at Pullman, Wash.

The disease is known as the Ehlers-Danlos Syndrome (EDS). Affected persons have skin that tears easily and joints that are elastic and easily stretched. The dogs have the same skin and joint conditions—in fact, no recognizable differences have been found between their disease and EDS in humans.

Veterinary pathologists Gerald A. Hegreberg, George A. Padgett, and James A. Henson of Washington State University and John R. Gorham of ARS are conducting the study. The colony of dogs was started in the fall of 1965 when the researchers received two Springer spaniels, a male and a female, affected with the condition. They bred these dogs to affected and nonaffected dogs and determined that the condition is inherited in dogs as EDS is in man. The colony now numbers 15.

Because of the special nature of these dogs, they must be kept in a carefully controlled environment where there are

no nails, rough wood, or other sharp objects.

Cases of EDS are rare—only 400 have been reported in man since 1900—but through their studies, the researchers hope to find out what gives skin its strength. This could help solve the mystery of structural protein formation and maturation.

Mink are also affected with this condition, and they too are under study in an experimental mink herd at Pullman. The disorder is of economic importance to the mink rancher because affected pelts have no value.

Late-planted alfalfa beats dodder

Traditionally, it's been considered unwise to plant seed alfalfa on dodder-infested fields otherwise suitable for seed production. But now a way has been found to best the problem.

In field studies at Prosser, Wash., ARS agronomist Jean H. Dawson determined that alfalfa seedlings can escape the fatal effects of dodder parasitism if planted in late summer. The technique also eliminates the need for herbicide applications to control dodder during establishment of a stand.

Established alfalfa usually survives dodder attacks but yields very little seed. And there are herbicides that control dodder effectively in established alfalfa. But the problem has been to protect seedlings until they were large enough to tolerate the herbicides.

According to Dr. Dawson's experi-

ments, the solution lies in regulating planting times. Alfalfa grows well at temperatures too low for vigorous development of dodder, which must be attached to alfalfa seedlings for several weeks before severe damage occurs. Thus, late planting gives the alfalfa seedlings time to develop well, while the cooler temperatures prevent vigorous dodder growth.

In field plots in central Washington, alfalfa seeded after August 15 escaped all detrimental effects of dodder during the seeding year. It survived the winter and was large enough for herbicide treatment in the spring.

Dr. Dawson points out that this technique, appropriately timed for local conditions, should work similarly in any region where the top growth of alfalfa is killed by frost.

This publication reports research involving pesticides. It does not imply that pesticide uses discussed here have been registered. Registration is necessary before recommendation. Pesticides can be injurious to humans, domestic animals, desirable plants, and fish or other wildlife—if not handled or applied properly. Use all pesticides selectively and carefully.

